

LETTERS

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GOLDEN EAGLE ATTACKS AND KILLS ADULT MALE COYOTE

Golden Eagles (*Aquila chrysaetos*) attack and kill a wide range of small mammals, birds, and reptiles (e.g., Olendorff 1976, *Am. Midl. Nat.* 95:231–236; Johns 1977, *Blue Jay* 35:92–93; Servheen 1978, *Murrelet* 59:77; O’Gara 1994, Pages E41–E48 in S.E. Hygnstrom, R.M. Timm, and G.E. Larson (Eds.), *Prevention and Control of Wildlife Damage*. USDA, Animal and Plant Health Inspection Service, Animal Damage Control, Washington, DC U.S.A.). When the abundance of preferred prey declines (Steenhof and Kochert 1988, *J. Anim. Ecol.* 57:37–48), Golden Eagles will attack larger animals, including sheep and cattle (Arnold, 1954, USFWS Cir. 27; Lock and Stephen 1959, *J. Anim. Ecol.* 28:43–50; Bergo 1987, *Fauna Norv. Ser. C. Cinculus* 10:95–102; Phillips et al. 1996, *Wildl. Soc. Bull.* 24:468–470), reindeer (*Rangifer tarandus*; Nybakk et al. 2000, *Wildl. Soc. Bull.* 27:1038–1042), ibex (*Capra ibex*; Nievergelt 1966, *Der alpensteinbock Capra ibex L. in seinem Lebensraum* Verlag Paul Parey, Hamburg, Germany), red deer (*Cervus elaphus*; Northeast 1978, *Br Birds* 71:36–37; Rebecca 1986, *Scott. Birds* 14:86), pronghorn (*Antilocapra americana*; Deblinger and Alldredge 1996, *J. Raptor Res.* 30:157–159), and roe deer (*Capreolus capreolus*; von Raesfeld 1965, *Das rehwild*, Verlag Paul Parey, Hamburg, Germany). Apparently, such depredation on large mammals is neither unusual nor site specific (Nybakk et al. 2000). Golden Eagles also will attack other predators, including Peregrine Falcons (*Falco peregrinus*; VanZandt 1982, *Colo. Field Ornithol.* 16:20–21) and red fox (*Vulpes vulpes*; Hatch 1968, *Blue Jay* 26:78–80). Eagles have been seen feeding on coyote (*Canis latrans*; e.g., Woelfl and Woelfl 1994, *Can. Field-Nat.* 108:494–495) carcasses, but no incidents of actual killing of coyotes have been reported.

On 23 December 1998 at 1600 H, I observed a coyote running along the crest of a hill in sagebrush-grass steppe 20 km northeast of Preston, ID U.S.A. A Golden Eagle circling perhaps 20 m above the hill stooped on the coyote and struck it just behind the shoulders knocking it to the ground. Almost immediately (within 10 sec), the eagle released the coyote and the coyote stood and ran over the crest of the hill. After a few moments (perhaps 30 sec), the eagle flew off in the direction the coyote disappeared. I arrived at the attack site about 20 min. later and followed the coyote’s tracks and a blood trail in fresh snow. I flushed the eagle from a coulee about 50 m from the top of the hill and found the coyote where the eagle was. The coyote was dead and the body cavity had been opened just below the ribs. The heart and portions of the liver were missing. The stomach and intestines remained intact, although they had been pulled from the carcass.

The coyote was an adult male and the carcass (minus the portion consumed by the eagle) weighed 13.5 kg. There were two sets of puncture wounds just anterior to the shoulders. Each set consisted of two punctures about 4 cm apart with a third wound about 10 cm behind. This pattern is typical of an eagle attack (Wade and Browns 1984, *Texas Agric. Ext. Serv. Publ. No. B-1429*). I skinned the coyote and found that the talons had punctured the lungs and aorta. There were no other obvious wounds.

Others have reported eagle attacks on coyotes and eagles feeding on coyote carcasses. Woelfl and Woelfl (1994) reported four Golden Eagles feeding on a freshly killed coyote pup in southeastern Alberta, Canada. They surmised that the coyote was surprised and killed while foraging about 300 m from cover. Ford and Alcorn (1964, *Condor* 66: 76–77) and Dekker (1985, *Can. Field-Nat.* 99:383–385) described several unsuccessful Golden Eagle attacks on coyotes. Bowen (1980, *J. Mammal.* 61:376–377) and Wells and Bekoff (1978, *J. Mammal.* 59:886–887) reported apparent competition among Bald Eagles (*Haliaeetus leucocephalus*), Golden Eagles, and coyotes for carrion. All reports of eagle predation on coyotes describe attacks during winter and early spring (Woelfl and Woelfl 1994).

Golden Eagles will attack a variety of large mammals, most frequently during winter and early spring, times of the year when food is scarce or nutritional requirements may be high (e.g., Deblinger and Alldredge 1996; Seguin and Thibault 1996, *Rev. Ecol. Terre Vie* 51:329–339). The available evidence suggests that these attacks are generally successful, provided that the quarry can be individually isolated (Nybakk et al. 2000), and that it can be ridden until it collapses from exhaustion, shock, or internal injuries (Watson 1997, *The Golden Eagle*, T. & A.D. Poyser, London, U.K.).

While limited, there is literature suggesting that mammalian predators are more likely to attack large prey when provisioning offspring (Till and Knowlton 1983, *J. Wildl. Manage.* 47:1018–1025; Knowlton et al. 1999, *J. Range Manage.*, 52 398–412). I speculate that the same motivation could, in part, explain predation by Golden Eagles on relatively large animals. During the nesting season, Golden Eagles will kill 230 kg domestic calves (O’Gara 1978, *Proc. Vertebr*

Pest Conf. 8:206–213; Grahm 1986, *Scott. Birds* 14:86; Phillips and Blom 1988, *Proc. Vertebr. Pest Conf.* 13:241–244; Phillips et al. 1996), adult domestic sheep and lambs (Svendson 1980 *Var Fuglefauna* 3:20–26 Hewson 1984, *J. Appl. Ecol.* 21: 843–868; Scrivner et al. 1990, Univ. Calif. Hopland Field Stn. Publ. No. 101:10–13) and adult reindeer (Nybak et al. 2000). Although large prey are most often selected in inverse relationship to the availability of smaller prey (e.g., Steenhof and Kochert 1988), killing of livestock can occur even when small otherwise preferred prey such as jackrabbits (*Lepus* spp.) and ground squirrels (*Spermophilus* spp.) are readily available (Phillips et al. 1996). Likewise, Nybak et al. (2000) documented winter and early spring predation on semidomesticated reindeer calves and does. Halda (1983, *Fauna* 36:101) reported late winter and early spring Golden Eagle predation on mature roe deer. Tigner (1973, *Southwest. Nat.* 18:346–348), Goodwin (1977, *Auk* 94:789–790) and Deblinger and Alldredge (1996) all reported eagle attacks on adult and fawn pronghorns in spring. Northeast (1978) and Rebecca (1986) reported winter and spring attacks on red deer; Lawson and Johnson (1982, Pages 1037–1055 in J.A. Chapman and J.A. Feldhammer [Eds.], *Wild mammals in North America: biology, management and conservation*, Johns Hopkins Univ. Press, Baltimore, MD U.S.A.) reported predation on bighorn sheep lambs (*Ovis canadensis*) and Wigal and Coggins (1982, Pages 1008–1020 in J.A. Chapman and J.A. Feldhammer [Eds.], *Wild mammals in North America: biology, management and conservation*, Johns Hopkins Univ. Press, Baltimore, MD U.S.A.) reported killing of mountain goat (*Oreamnos americanus*) kids.

Seasonal differences in prey selection by eagles, especially as they might reflect changes in nutritional requirements, have not been well investigated (Seguin and Thibault 1996) and the available evidence is somewhat contradictory. Some studies, for example, suggest that large prey are favored early in nesting (Fernandez and Ceballos 1990, *Ornis Scand.* 21:236–238). Others suggest that such prey are unimportant for nesting birds but instead are favored by overwintering eagles (Mollhagen et al. 1976, *J. Wildl. Manage.* 36:784–792). Because there are data consistent with the possibility that prey-size selection by mammalian predators may be influenced by the number of offspring being fed (Till and Knowlton 1983), it might be worthwhile to investigate whether there is evidence of a similar facultative response expressed by raptors.

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GOLDEN EAGLE PAIR KILLS FERRUGINOUS HAWK IN WYOMING

We saw a pair of Golden Eagles (*Aquila chrysaetos*) kill a lone adult Ferruginous Hawk (*Buteo regalis*) in Thunder Basin National Grassland (TBNG) in East Central Wyoming on 20 June 1999. The attack took place around 1100 H in the Rochelle Hills area (43°52'18"N, 105°01'42"W). We were sitting in a stopped vehicle and watched the attack from 0.8 km away. The eagles alternatively dove upon the hawk as it flew less than 7 m from the ground. The attack lasted about 25 min from the time we first observed it and consisted of five dives by each eagle. The attack sequence entailed one eagle diving on the hawk followed within 30 sec by the second when the hawk was occupied with the first eagle. The Ferruginous Hawk either rolled onto its back exposing its talons to the diving eagles or turned sharply to avoid contact. On the fifth attempt, the second eagle hit the hawk in the air. The eagle continued to hold onto the dead hawk as they fell to the ground where the eagle mantled the hawk. Previous literature indicated this tandem hunting strategy used by eagles taking black-tailed jackrabbits (*Lepus californicus*) and a red fox (*Vulpes fulva*) in which one eagle either flushed the prey or diverted its attention while the second eagle attacked (Hatch 1968, *Blue Jay* 26: 78–80, Collopy 1983, *Auk* 100:747–749). We did not determine the sex of the eagle that made the kill. The second eagle landed 2 m away and both eagles remained on the ground for 5 min. Neither eagle consumed any of the carcass and the pair flew off together. We watched the event from a distance and did not harass the eagles forcing them to abandon the kill. Neither eagle appeared disturbed for any reason but remained calm during the time spent on the ground and as it flew away.

Golden Eagles prey upon a variety of species ranging in size from small rodents to ungulates such as antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) (Hogstrom and Wiss 1992, *Ornis Fenn.* 69:39–44, Watson et al. 1993, *Ibis* 135:387–393, Deblinger and Alldredge 1996, *J. Raptor Res.* 30:157–159). Golden Eagles have attacked